

the blood are contra-indications to operation. Too frequently the surgeon neglects to sum up his operative risk until the patient is off the operating table and in bed. Not until then does he begin to worry about the shock, the condition of the heart, kidneys and lungs, and the possibility of hemorrhage. As soon as the operator comes to realize the necessity of having a medical man examine all his cases before submitting them to operation, many bad operative risks will be rejected and the immediate mortality reduced. Cholecystectomy is indicated in all cases of malignancy, hydrops, chronic empyema when the cystic duct is not patulous, gangrene of the gall-bladder, large thick walled gall-bladder, extensive adhesions, and when many small calculi are imbedded in the gall-bladder mucosa. The drainage of the common duct following cholecystectomy is indicated in certain conditions (H. Kehr, *Archiv. f. klinische Chirurgie*, 1912, Vol. 92, pp. 26-39). These are when the head of the pancreas is involved, when the common duct is thick and distended, when there is a history of icterus, colic, chills, sweats and fever; when a considerable length of the cystic duct is left; and when many small stones are found in the gall-bladder and cystic duct, causing suspicion of similar ones in the common duct. The drainage of the hepatic duct is recommended when cloudy pus oozes from the stump of the cystic duct, when the liver is enlarged, when it is indurated, and when cirrhosis is present.

Whether cholecystectomy should be done in the presence of acute suppurative cholecystitis confined to the gall-bladder is debatable. Crile (*Surgery, Gynecology and Obstetrics*, 1913) thinks that in most cases of acute infection the gall-bladder should be drained, and later, if required, a cholecystectomy performed. Deaver recommends cholecystectomy as a primary operation. For the operator who has only an occasional biliary case, it is likely that the two-stage operation will be found more satisfactory. In the mild chronic inflammatory conditions of the gall-bladder, if the operator is convinced that cholecystostomy will relieve the infection and prevent further pathologic progress, it is the operation of choice.

In conclusion I wish to emphasize the fact that at present economical factors seem to be forcing the general practitioner to accept for treatment many of those cases which formerly were referred to the surgeon. Owing to the rapid advancement in medical science, the thorough preparation necessary for the assumption of this responsibility is becoming more difficult, and of necessity the general practitioner must plan some educational scheme for the study of progressive methods and results. He must favor and court consultation with men better informed than he, so that the best interest of his patient may be safeguarded. The consulting surgeon should face these conditions as they exist and must often seem to humiliate himself by amicably playing the part of an adviser or assistant at the operating table to an inferior operator, to the same end that the best interests of the patient may be conserved; for, after all, the welfare of the sick is the fundamental problem to be considered. Whether the individual falls into the hands of the

general practitioner or of the surgeon, the whole profession is to a certain extent judged by the outcome. In humiliating himself (if he so considers it) the consultant may be consoled by the thought that he has aided in improving the skill of a member of his own profession and has thus assisted in elevating the tone of the whole.

SOME RECENT STUDIES IN GASTRIC SECRETION.*

By ROBERT POLLOCK, M.D., San Diego.

The advance along the line of our knowledge of gastric secretion has been somewhat intermittent; long periods of quiescence intervening between the few periods of active progress, which were of sufficient prominence to stand out in bold relief. Just such a period, however, we are passing through at the present time.

After accepting the results of any research worker as proven, we are very prone to consider them as final; and so long as they reasonably fulfil the requirements of our daily problems, we are content to believe that they leave nothing to be desired.

In our secretory study of the human stomach, we have, for many years, followed, with more or less complacency, the method of aspirating and analyzing the contents of that organ at the end of an hour following a test-meal consisting of bread and water. With the exception of the "motor-meal," and an occasional meal directed to clearing up some special point, this has been our routine method of study; and the results so obtained we considered as fairly representing the type of secretion of the individual so examined. These results also were compared with certain standards which we had accepted as representing normality.

Doubtless many workers have at times questioned the accuracy of the results so obtained. The question naturally intruded: does the one-hour specimen fairly represent the height of activity of the gastric juice, or does it even serve to point the type of secretion, whether normal, over-normal or under-normal for the individual under observation? Nevertheless, with one or two exceptions, previous to the year 1914, no observations had been published, showing a more detailed study of the stomach contents, at varying periods following a test-meal. Those published, while not convincing, tended still further to strengthen our doubts as to the reliability of the standard methods. Obviously one obstacle in the way of a broader study of the subject, was our somewhat crude method of obtaining the material for analysis.

While the inventive genius of Dr. Max Finhorn paved the way for a better method when he devised his so-called "duodenal tube"; still the full possibilities attached to its further development and use were not emphasized until the summer of 1914, when Drs. Rehfuess, Hawk, Bergheim and their associates, working at Jefferson Hospital in Philadelphia, began an elaborate study of the subject, which bids fair to revolutionize our views on

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gastric secretion. These workers first modified the "Einhorn tube" to suit their ideas of the requirements of the work. This was done by enlarging the capsule or "bucket," and changing its shape. Also the windows or openings were enlarged to equal the diameter of the tubing used. The tube, as they use it, and as it is now being used by many men throughout the country, may roughly be described as a soft rubber tubing about 125 cm. long, with the caliber of a No. 8 French scale catheter (about 3 mm.).

particular time, must represent closely the work of that particular stomach.

I thus particularize as a prelude to the following statement: While the physiological stomach of any given individual will usually register its work by curves, bearing a close resemblance to one another, the same stomach, after becoming pathologic, not only shows a curve of a different type from its former normal one, but may show distinct variations in type from week to week, in accordance with changes in the pathologic factor.

Chart No. 1. Showing Secretary Curve of Case 1.

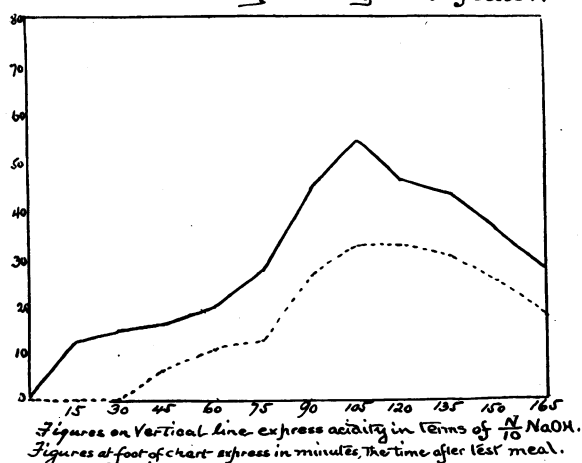


CHART I

To the end intended for insertion into the stomach, is attached an olive-shaped, hollow bulb, about 15 mm. long, perforated with four longitudinal windows, about 12 mm. long and 3 mm. wide; thus corresponding to the caliber of the tubing. The bulb is of hard metal, in order to resist erosion, thus permitting its retention in the stomach or duodenum for long periods of time. The weight of this metal also favors the ready passage of the bulb, when the patient is in the upright sitting position.

This tube obviously fulfils many of the indications of a practical apparatus. Its size and flexibility, coupled with the weight of its bulb, enables it to be readily passed with a minimum amount of discomfort to the patient; while, once in position, it may be left there indefinitely with almost no inconvenience to the patient, who is able to breathe, talk, and swallow fluids with perfect freedom. The windows in the bulb are of such a size that they rarely become obstructed with mucous or food particles; while aspiration of the stomach contents can readily be effected with an ordinary glass piston syringe having a catheter point. Thus it becomes a simple matter to withdraw for analysis portions of the stomach contents at such intervals, and for such a period of time as the observer desires.

The secretion may thus be studied closely from the time of the test-meal until the stomach has completely emptied itself, thus furnishing the data for a secretory curve or chart, which, at that

Chart No. 2. Showing Secretary Curve of Case 2.

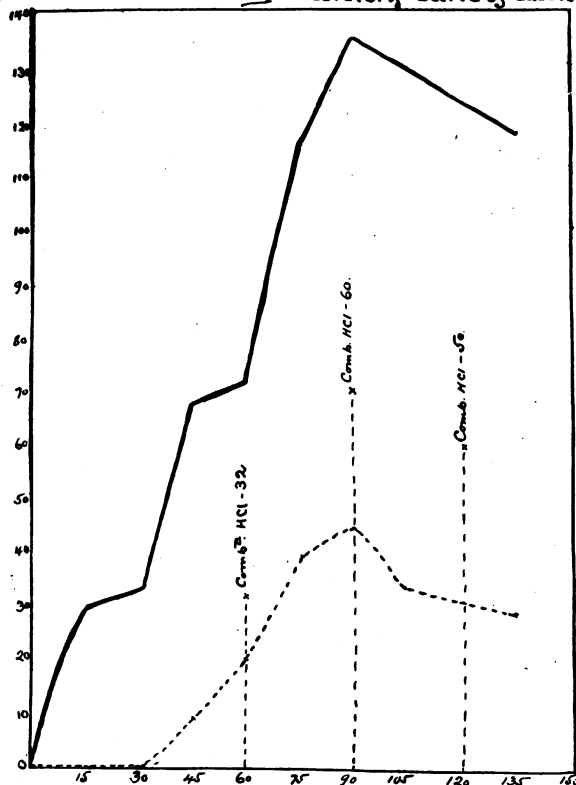


CHART II

This rule seems to apply equally well when the pathologic factor is present in the stomach itself, and when it resides in the nervous system or in remote organs. The word pathologic is used in its broader sense, as applying to either structural or functional change. With this in mind, it is reasonable to believe that we can follow intelligently the process of disease, represented by abnormal stomach secretion, only by making repeated examinations. This, as well as other statements in the paper, I wish to illustrate by cases, drawn from my own work, by showing their charts, and endeavoring to interpret them as logically as possible. If my deductions do not always appeal to your reason, try and remember that one of our daily occupations is drawing erroneous conclusions; and that one purpose of a paper before our society is to invite criticism and bring out divergent views.

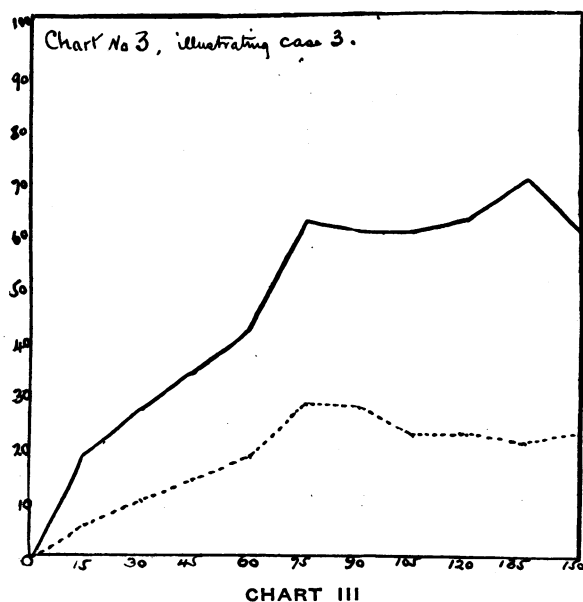
In all the charts shown, the Boas-Ewald test-meal of bread and water was used; and all acidities

are expressed in terms of $\frac{N}{10}$ Na OH, although for

the sake of greater speed and accuracy, $\frac{N}{100}$ Na OH

solution was used for titrating. The upper or solid line on the chart represents the total acidity curve, the lower or dotted line that of the free HCl. The figures under the base line represent in minutes the intervals of aspiration, or rather the number of minutes after the close of the test-meal, at which the aspirations were made.

Chart No. 1. Expresses the secretory curve of Case No. 1, a woman, aged 49 years, who gave

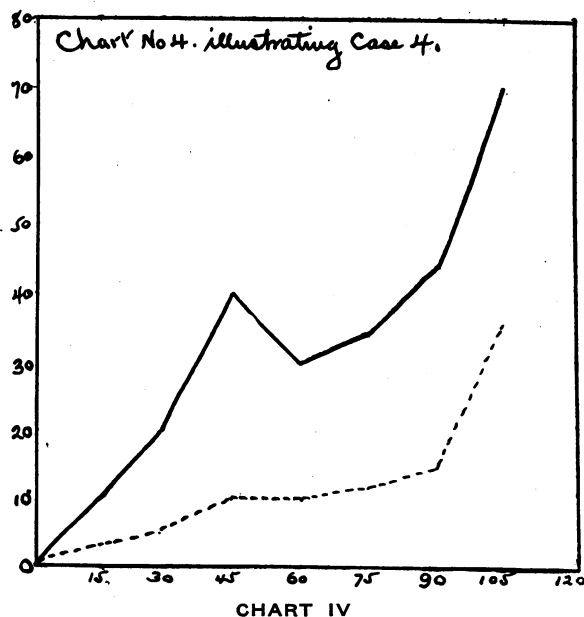


a clear history of hyperchlorhydria, of nervous origin, with symptoms covering a period of more than 30 years. Her statements regarding her suffering, the men of standing who had treated her, and the remedies that had given relief, left little doubt in my mind about the correctness of the diagnosis of nervous hyperacidity; and yet the analysis of the one-hour stomach content would scarcely point that way to-day. In fact it would only tend to confuse us. The fractional study, however, is not without interest. In the first place, it points to a secretion that is elaborated slowly, reaching the height of its activity only after one and three-quarter hours. This, when considered with the history, and the present very moderate acidity curve, suggests to me a secretory apparatus, which from long years of overactivity, is now beginning to show the natural result in the form of lessened functional power. If this reasoning is correct, we shall probably find this case gradually progress to complete achylia. In the meantime, however, there are other points to be considered. Before giving the test-meal, the stomach was completely emptied of its fasting contents, which consisted of 75 c.c. of food-fluid, having a total acidity of 11.8 and a free HCl acidity of 5.6; and it seems to be this fasting secretion which at present is causing her discomfort. Obviously this stomach's secretory work is distinctly not physiologic, and demands careful watching, with the use of appropriate remedies when indicated. The sluggish emptying power, exhibited by the organ taking as it does two and three-quarter hours to reach a point corresponding roughly to its fasting state,

suggests that its musculature, as well as its glandular mechanism is failing; and indicates such measures as will tend to improve muscle tone. The chemical and microscopical study of the fasting contents fails to give any evidence of structural change.

Case 2, illustrated by chart No. 2. A woman, 29 years of age, with a distinct history of nervous overstrain for years. Her symptoms suggested a hyperacidity, probably accompanied by ulcer of mild grade; and the fractional study tended to confirm this, although the microscopical study of the fasting contents indicated a gastritis. I am inclined to look upon this case as one of ulcer superimposed on a previous gastritis; the complex being symptomatically represented by the symptoms of high acidity, and the treatment dictated by the ulcer and the acidity.

The point that I wish to emphasize is the im-



possibility of getting any comprehensive idea of this case from its chemistry at the end of an hour following the test-meal. At that time, the total acidity was 72, and the free HCl 20, or roughly one-half what it attained in another half-hour. The fasting stomach in this case contained 35 c.c. of food-free fluid, containing much mucous and a small amount of bile. Its analysis showed a total acidity of 50, all of which proved to be combined HCl. This case in contradistinction to the previous one, elaborated very rapidly a highly acid gastric juice; but it must be borne in mind that both the patient and her condition boasted fewer years than in the case of No. 1.

Case No. 3, illustrated by chart No. 3, is similar in some respects to the one just described, but came under observation before I began using the fractional method of studying the secretion. Thus I found it considerable of a puzzle for some time. It records the history of a young man, aged 25 years, of slightly neurotic type, with symptoms suggesting mild hyperacidity and accompanied by bile regurgitation. The first analysis of the one-hour specimen showed a total acidity of 42, and a free HCl of 18; certainly not strongly corroborative of my suspicion of a neurotic hyperchlorhydria. Even after the bile regurgitation, which is not a common accompaniment of low acidity, had been cleared up, his symptoms of stomach distress remained; and it was not until the fractional study had been applied that I was able to see the secretion in its true outline: that of a slowly forming hyperacidity. Since that time he has progressed

rapidly toward recovery, and is to-day free from his long-standing distress.

Case No. 4, illustrated by chart of same number, records a woman, 35 years old, who for years had been treated for ulcer with high acidity. She had been dieted to the point of emaciation, in efforts to relieve her subjective symptoms of burning from the tongue-tip to the epigastrium. Her stomach had sagged to the brim of the pelvis, its lower border being about two inches above the symphysis. A moderate colitis, with ptosis of the transverse colon and an intermittent constipation combined to complete a rather gloomy picture. After gravity replacement of the ptosed viscera, and support with a "Rose" belt, this patient improved steadily for two months, gaining 15 lbs. in weight during the first month and 10 lbs. during the second; but her discomfort was but partially relieved. At this time I made a fractional study of her secretion, preceded by a study of the fasting contents. The latter showed 30 c.c. of food-free fluid, containing a total acidity of .30, and free HCl acidity of 10. Reference to the

stress at varying periods after eating, was obstinately constipated, was unable to concentrate on his work; and in fact gave evidence that all functions were performed at the behest of a very instable nervous system.

A fractional study of his secretion showed an achylia, with no HCl, free or combined, and only a trace of ferment activity. Evidence of a moderate colitis was present; but otherwise neither stools nor contents of the fasting stomach gave indication of structural change.

In this case, an analysis at the end of an hour would have pointed the condition; but the later handling of the case was facilitated by the more accurate knowledge furnished by the fractional method.

In connection with this case, I wish to emphasize two facts. First, that achylia is a very common condition, among the enervated people that we meet in large numbers here in Southern California; and second that a considerable percentage of these achylous stomachs resume their function under favoring conditions. This man's stomach chemistry at the end of two months, had come back practically to that of a normal individual. He had gained in weight, had a normal bowel function, and was able to enjoy his meals, both as to relish and freedom from discomfort. I wish that I could add that he no longer gave evidence of nervous exhaustion; but I consider him in line to eventually overcome even this tedious condition. His chart, No. 5, shows the two analyses, side by side, with dates attached, to allow of easy comparison.

The intricate study of both the motor and secretory functions of the stomach, as well as the more accurate measurement of its fasting contents, made possible by the introduction of this newer apparatus and technic, open up many unsolved problems and give promise of their early settlement. Among these may be mentioned the following:

1. Does each individual have a physiologic secretory curve peculiar to himself?
2. Does any given pathologic condition always adhere more or less closely to a certain type of curve?
3. Can changes in the course of disease be indicated by changes in the type of the curves produced?
4. Does the "Boas-Ewald" meal furnish everything desired in a secretory test-meal?
5. How do water and distilled water compare with the bread and water meal as stimulants of secretion?
6. What, if any, are the objections to adopting distilled water as the standard test-meal?
7. Does not the fact that water stimulates gastric secretion, indicate the use of water as a beverage at meal time rather than at periods when the stomach should be at rest?

Finally, may we not reasonably hope that the further refinements of the method of fractional study will bring out points of value in differentiating pathologic conditions, expressing themselves through the stomach?

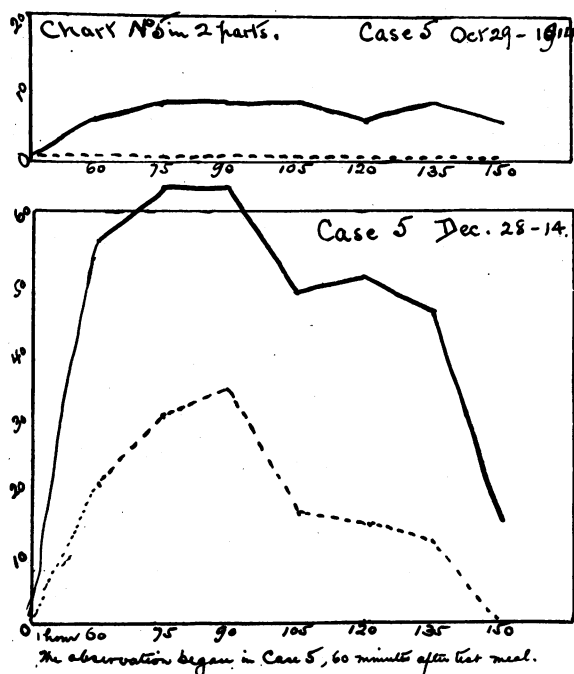


CHART V

chart shows that while at the end of an hour following the test-meal the picture did not indicate a high acidity, it rapidly took on such a picture after one and a half hours. How high this curve would have gone I do not know; because at the end of one and three-quarter hours the observation was terminated at the request of the patient, who complained of fatigue. However, the type of curve was sufficiently indicated to enable me to anticipate the upward trend of the secretion and counteract it by appropriate measures. This patient is still under monthly observation, is taking no medicine and is feeling and acting perfectly normally.

Case No. 5 represents two phases of a different type of case, namely, a low secretion type. The case here illustrated is that of a professional man, aged 52 years, who had, through many years been developing an extreme grade of nervous exhaustion, of which his digestive condition is merely an expression. He complained of considerable dis-